

Please read this data sheet before purchasing, and keep it on file for future reference. It contains important information on the product specifications.

**Optocom**

**Optoelectronics Group**

**OPT2225-5.Ø**

**OC-12 Optical Transmitter**

**Data Sheet**

**2004/5**



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## General

### Description

The OPT2225-5.Ø is a 20-pin DIP fiber optic transmitter module which converts electrical data signals to lightwaves in the 1310 nm band at data rates from 1 Mbps to 650 Mbps. The transmitter consists of a hermetic, 1.3 µm, InGaAsP/InP MQW FP laser and a circuitry providing modulation, automatic optical power control and thermal compensation.

### Applications

The device is designed for data communication systems and telecommunication transmission systems over singlemode fiber.

### Standards Met

The specifications met are: the SONET/SDH STS-12/STM-4 interface, the Intermediate Reach OC-12 Optical Parameters (IR-1) of Bellcore GR-253-CORE, the Short-haul Recommendation (S-4.1) of ITU-T G.957, and the monitor & alarm

requirements of Bellcore GR-253-CORE & ITU-T G.783 and G.958.

## Function

### Operation Features

The OPT2250-5.Ø optical transmitter operates using either a single +5 V or -5 V power supply. The device maintains electrical and optical stability over the specified temperature and voltage ratings. Outputs include the laser bias current monitor (LBM) voltage and the laser backface monitor (BFM).

### Operation Suggestions

Operator can disable optical output through a user-provided electrical input.

### User Options

For further uses of LBM and BFM, refer to Bellcore GR-253-CORE & ITU-T G.783.

## Ratings

### Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage*	V <sub>CC</sub> -V <sub>EE</sub>	0	6.0	V
Operating Case Temperature Range	T <sub>C</sub>	-40	+85	°C
Operating Relative Humidity (non-condensing)	H <sub>OP</sub>	---	85	%
Lead Soldering Temperature/Time	T/t	---	250/10	°C/s
Minimum Fiber Bend Radius	R <sub>F</sub>	32/1.25	---	mm/in.
Storage Case Temperature Range	T <sub>STG</sub>	-40	85	°C

\* With V<sub>CC</sub> and V<sub>EE</sub> connected to (+5 V, 0 V) respectively, or with V<sub>CC</sub> and V<sub>EE</sub> connected to (0 V, -5.2 V) respectively.

# Operating Characteristics

## Electrical

Parameter	Symbol	Min	Typ	Max	Unit
dc Power Supply Voltage	$V_{CC} - V_{EE}$	4.75	5.0	5.25	V
dc Power Supply Current	$I_{CC}$ or $I_{EE}$	---	100	200	mA
<b>Input Data Voltage:<sup>1,2</sup></b>					
Low	$V_L$	-1.95	-1.8	-1.45	V
High	$V_H$	-1.16	-0.9	-0.7	V
Input Swing <sup>3</sup>	$V_{PP}$	250	---	1000	mV
Common Mode Range	$V_{CM}$	$V_{CC} - 2.5$	---	$V_{CC} - 0.5$	V
Input Transition Time <sup>4</sup>	$t_i$	---	1.6	2.2	ns
Transmitter Disable Voltage <sup>5</sup>	$V_D$	$V_{CC} - 2.0$	---	$V_{CC}$	V
Transmitter Enable Voltage	$V_{EN}$	$V_{EE}$	---	$V_{EE} + 0.8$	V
Laser Bias Voltage <sup>6</sup>	$V_{LB}$	0.01	---	0.45	V
Laser Facet Voltage <sup>7</sup>	$V_{BF}$	0.01	---	0.20	V

<sup>1</sup> It is recommended for optimum performance to use  $\overline{DATA}$  &  $\overline{DATA}$  inputs simultaneously.

<sup>2</sup> Data inputs are 10K, 10KH, 100K, 10E, and 100E ECL compatible. Voltage is in reference to VCC.

<sup>3</sup> The input swing, is measured as the absolute difference between  $\overline{DATA}$  &  $\overline{DATA}$  inputs.

<sup>4</sup> Between 10% and 90% (50% duty cycle).

<sup>5</sup> The transmitter remains enabled and requires the user to provide an external voltage to disable.

<sup>6</sup> The laser bias current is determined to be the ratio of the voltage to an internal 10 $\Omega$  current-sensing resistor.

<sup>7</sup> Laser facet current is determined to be the ratio of the voltage to an internal 200 $\Omega$  current-sensing resistor.

## Optical

Parameter	Symbol	Min	Typ	Max	Unit
Average Power Output <sup>1</sup>	$P_0$	-15	---	-8	dBm
Operating Wavelength Range	$\lambda$	1274	---	1356	nm
RMS Spectral Width (MLM Laser)	$\Delta\lambda_{rms}$	---	---	2.5	nm
Extinction Ratio <sup>2</sup>	$E_r$	8.2	---	---	dB
Optical Rise & Fall Times <sup>3</sup>	$t_R, t_F$	---	---	0.6	ns
Jitter Generation, rms <sup>4</sup>	GJ	---	---	0.005	UI
Output Waveform <sup>5</sup>	SONET SDH Compliant				

## Operating Characteristics - continued

<sup>1</sup> Measured using an electrical input with a  $2^{23} - 1$  pseudorandom word having a 50% duty factor. It is also suitable to use additional measurement parameters and techniques specified in ITU-T Rec. G.957 and Bellcore GR-253-CORE. Optical loss of pigtail termination connector and measurement uncertainty is included in the numbers specified.

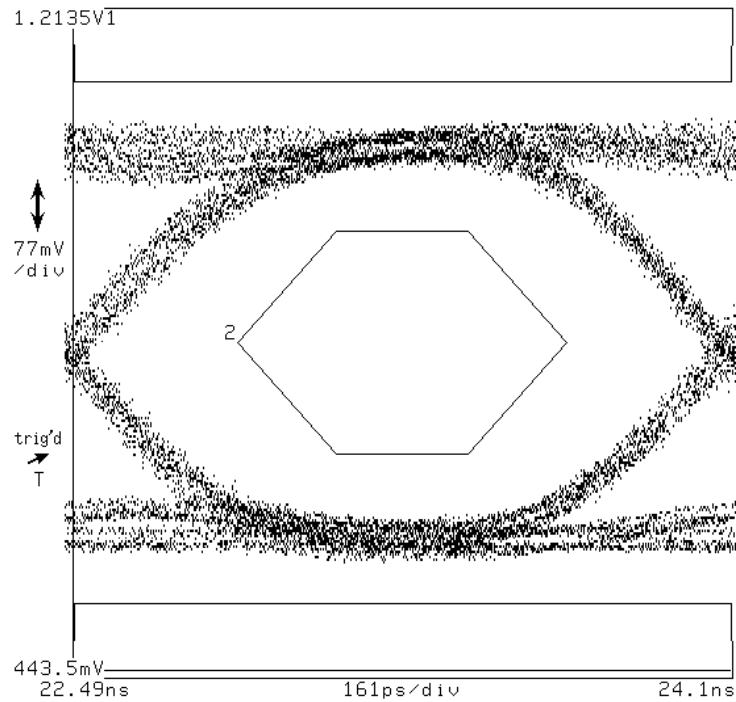
<sup>2</sup> The ratio of logic "1" to logic "0" average power levels calculated as  $10\log_{10}(P_1/P_0)$  in dB.

<sup>3</sup> Measured with a 50% duty factor from the 10% to 90% points.

<sup>4</sup> ITU-T Rec. G.958 and Bellcore GR-253 CORE (for Category II interfaces) list a fraction of the maximum amount of allowable generated jitter to allow for additional sources of jitter within the system. These ITU-T and Bellcore documents include information for measurement bandwidth specifications and techniques.

<sup>5</sup> The optical output meets the eye diagram mask determined by GR-253-CORE (Fig. 4.2 of GR-253-CORE).

## Eye Mask & Typical Output Waveform



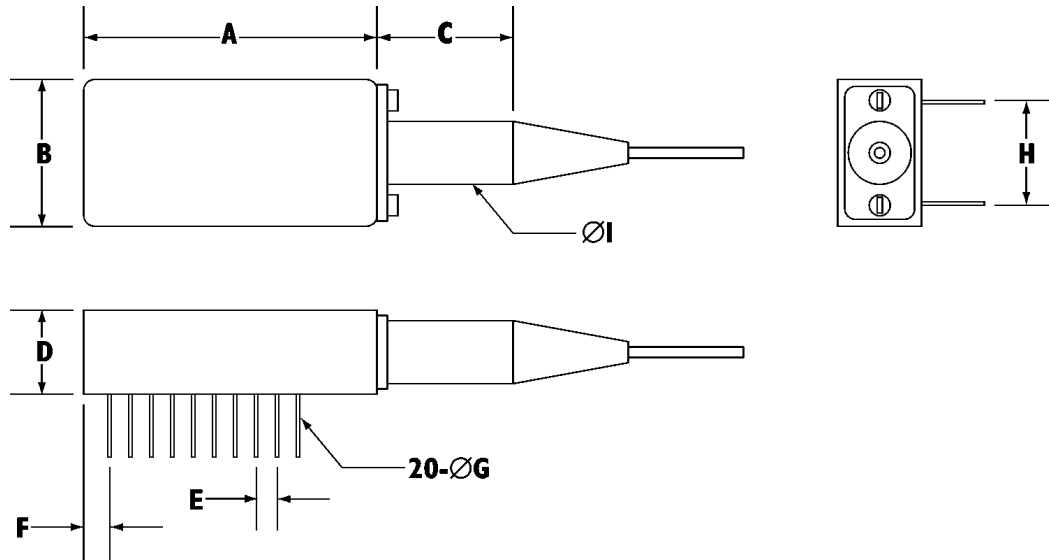
Bessel-Thomson filtered typical output waveform.

## Physical

The device package conforms to the 20-pin DIP outline shown in Figure 1. Dimensions for the package are also given in its corresponding Dimensions table.

Physical - continued

Outline Diagram



Dimensions

Dimension	Typ	
	Inches	Metric (mm)
<b>A</b>	1.300	33.0
<b>B</b>	0.635	16.13
<b>C</b>	1.000	25.40
<b>D</b>	0.365	9.27
<b>E</b>	0.100	2.54
<b>F</b>	0.110	2.79
$\text{Ø G}$	0.018	0.46
<b>H</b>	0.400	10.16
$\text{Ø I}$	0.236	6.00

## Physical - continued

An assigned serial number in both barcode and human readable formats appear on this device.

All markings and labels are permanent and meet the requirements of MIL-STD-883C-2015.7.

## Mounting and Connections

The pigtail consists of a single-mode (SM) fiber with an 8  $\mu\text{m}$  core. The outer jacket has a nominal 900  $\mu\text{m}$  diameter and is terminated

with an ST<sup>®\*</sup>, FC, or SC Connector. The minimal pigtail length is 1 meter (39.4 inches) long.

\* ST<sup>®</sup> is a registered trademark of AT&T

## Pin Designations

<b>Pin</b>	1	2	3	4	5	6	7	8	9	10
	NC	LBM(+)	NC	LBM(-)	V <sub>EE</sub>	V <sub>CC</sub>	DISABLE	V <sub>CC</sub>	V <sub>CC</sub>	NC
<b>Pin</b>	20	19	18	17	16	15	14	13	12	11
	NC	BFM(+)	V <sub>CC</sub>	BFM(-)	DATA(+)	DATA(-)	V <sub>EE</sub>	Case GND	V <sub>CC</sub>	Case GND

## Safety

### Laser Compliance Statement

The OPT2225-5.0 is classified as a:

- Class 1 Laser Product
- Laser Klasse 1
- Luokan 1 Laser laite
- Appareil A Laser De Classe 1
- Klass 1 Laser Apparat.

The OPT2225-5.0 is certified in the U.S. to conform to the requirements of the Department of Health & Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J of the FDA for Class 1 Laser Products.

 Caution - use of device other than those specified herein may result in hazardous laser radiation exposure. Please embrace all customary precautions & discretion while handling this device.

## Safety - continued

<b>Optical</b>	<ul style="list-style-type: none"><li>• Avoid direct eye exposure to laser beam projection area or a broken fiber under operation.</li></ul>
<b>Electrical</b>	<ul style="list-style-type: none"><li>• Warning against overvoltages or current surges as these may cause failure, electrical shock or fire.</li><li>• Solder leads to electronics entirely so as to eschew short circuits.</li><li>• Solder or plug in device while power is turned off.</li></ul>
<b>Other</b>	<ul style="list-style-type: none"><li>• Avoid storage above maximum temperature rating &amp; other extreme conditions.</li><li>• Avoid device disassemblment as damages may be incurred.</li><li>• Avoid excessive force to fiber pigtail and bending beyond a 20 mm radius.</li><li>• Take normal handling precautions as for all electrostatic sensitive devices.</li></ul>

## Appendix

### Terms

BFM: indicates the laser output power

LBM: indicates the total amount of dc current supplied to the laser

NC: not connected

## Additional Information

### Contact

For additional information, product specifications, or information about Optocom:

Internet: <http://www.optocom.com>

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